FIG. 1

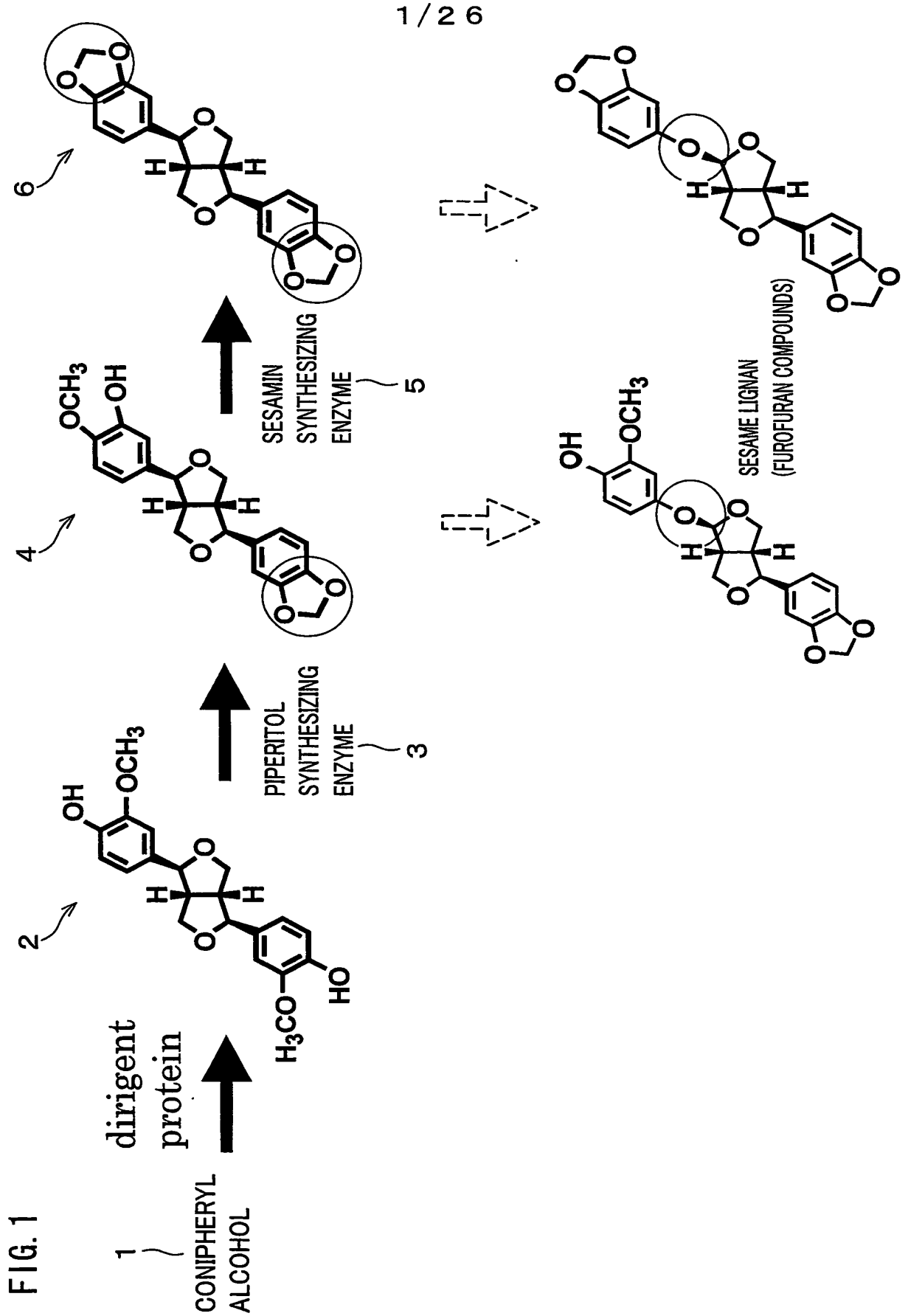

1
CONIPHERYL ALCOHOL
dirigent protein
2
PIPERITOL SYNTHESIZING ENZYME
3
4
SESAMIN SYNTHESIZING ENZYME
5
6
SESAME LIGNAN (FUROFURAN COMPOUNDS)

FIG. 2(a) pYE22m / PINORESINOL

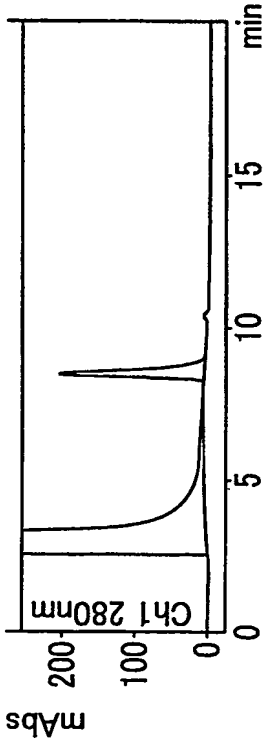


FIG. 2(b) SiP189 / PINORESINOL

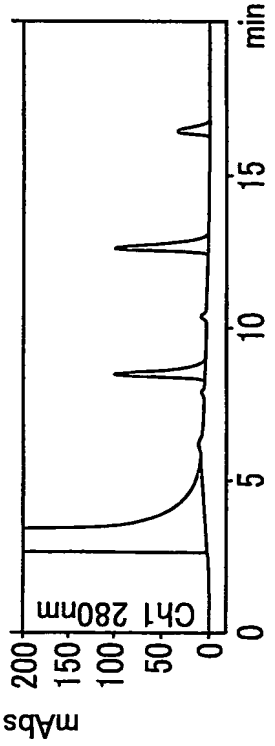


FIG. 2(c) SiP189 / PINORESINOL -NADPH

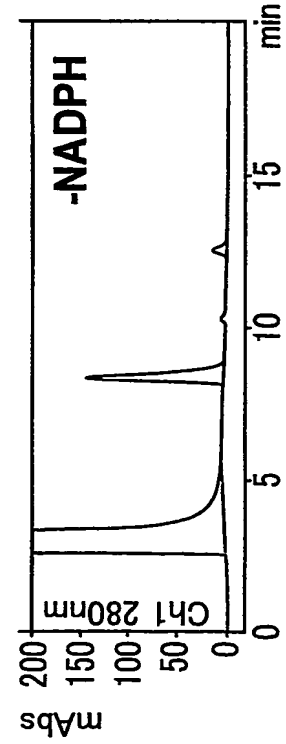


FIG. 2(d) pYE22m / PIPERITOL

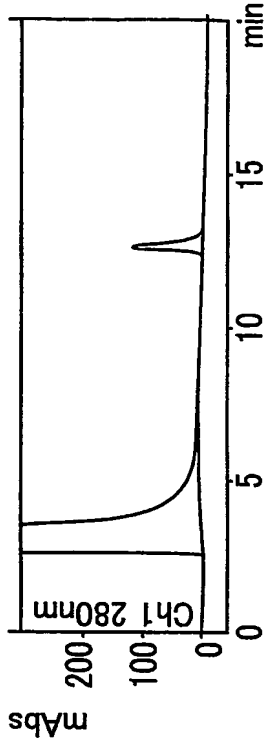


FIG. 2(e) SiP189 / PIPERITOL

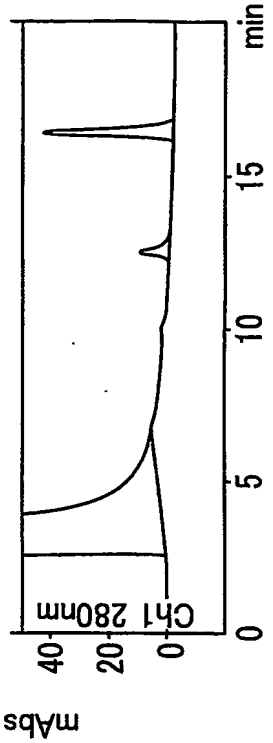


FIG. 2(f) SiP189 / PIPERITOL -NADPH

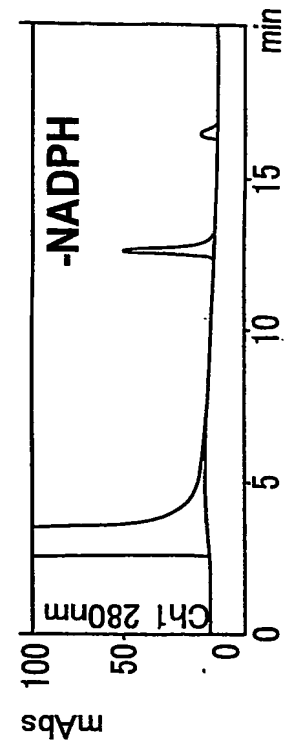


FIG. 3

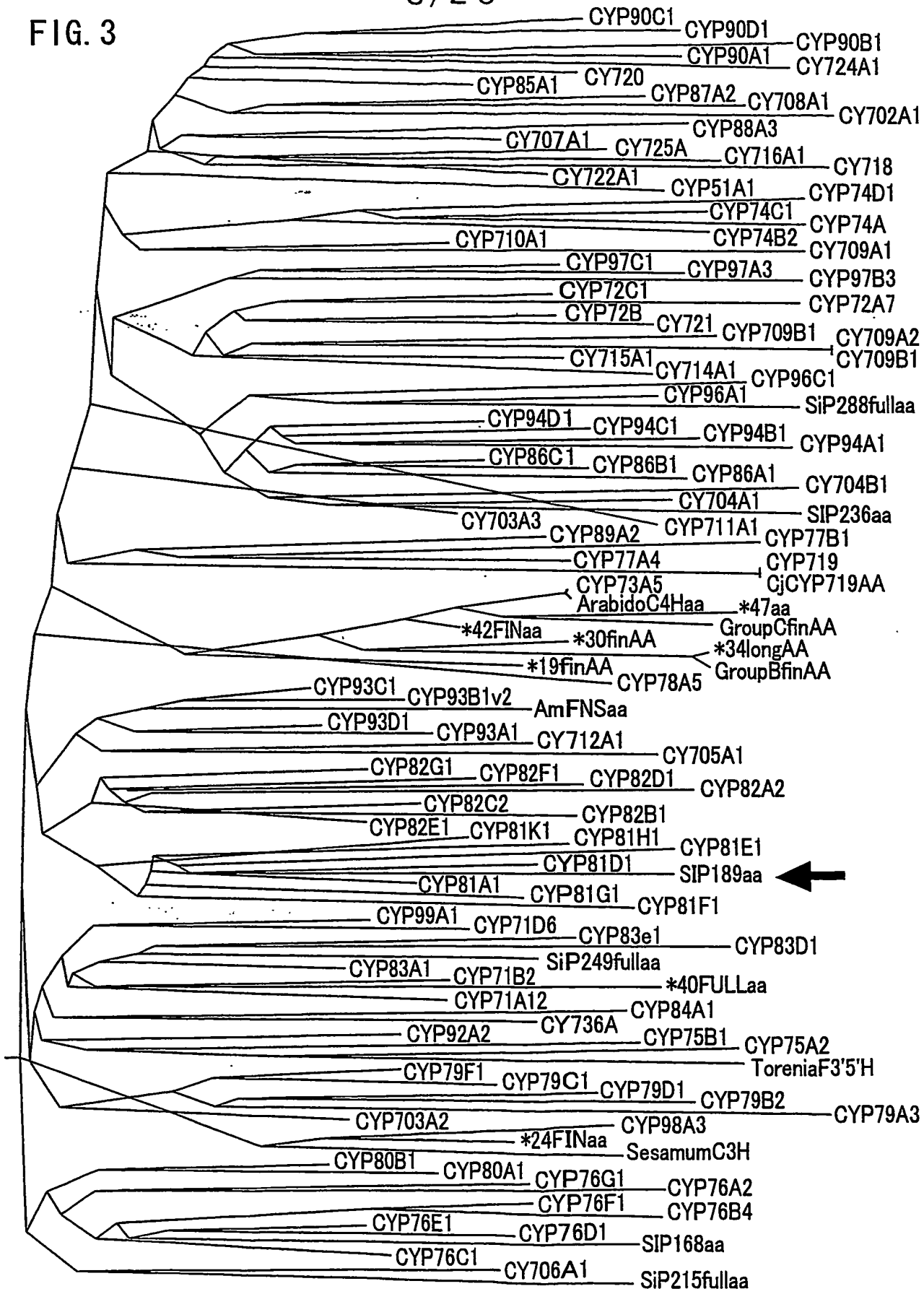

CYP90C1
CYP90D1
CYP90B1
CYP90A1
CY724A1
CYP85A1
CY720
CYP87A2
CY708A1
CY702A1
CYP88A3
CY707A1
CY725A
CY716A1
CY718
CY722A1
CYP51A1
CYP74D1
CYP74C1
CYP74A
CYP710A1
CYP74B2
CY709A1
CYP97C1
CYP97A3
CYP97B3
CYP72C1
CYP72A7
CYP72B
CY721
CYP709B1
CY709A2
CY715A1
CY709B1
CY714A1
CYP96C1
CYP96A1
SiP288fullaa
CYP94D1
CYP94C1
CYP94B1
CYP94A1
CYP86C1
CYP86B1
CYP86A1
CY704B1
CY704A1
SIP236aa
CY703A3
CYP89A2
CYP711A1
CYP77B1
CYP77A4
CYP719
CYP73A5
CjCYP719AA
ArabidoC4Haa
*47aa
*42FINaa
*30finAA
GroupCfinAA
*34longAA
*19finAA
GroupBfinAA
CYP78A5
CYP93C1
CYP93B1v2
AmFNSaa
CYP93D1
CYP93A1
CY712A1
CY705A1
CYP82G1
CYP82F1
CYP82D1
CYP82A2
CYP82C2
CYP82B1
CYP82E1
CYP81K1
CYP81H1
CYP81E1
CYP81D1
SIP189aa
CYP81A1
CYP81G1
CYP81F1
CYP99A1
CYP71D6
CYP83e1
CYP83D1
CYP83A1
SiP249fullaa
CYP71B2
*40FULLaa
CYP71A12
CYP84A1
CY736A
CYP92A2
CYP75B1
CYP75A2
ToreniaF3'5'H
CYP79F1
CYP79C1
CYP79D1
CYP79B2
CYP79A3
CYP703A2
CYP98A3
*24FINaa
SesamumC3H
CYP80B1
CYP80A1
CYP76G1
CYP76A2
CYP76F1
CYP76B4
CYP76E1
CYP76D1
SIP168aa
CYP76C1
CY706A1
SiP215fullaa

FIG. 4

> Blastx Search (SST vs PIR)

Reference: Altschul, Stephen F., Thomas L. Madden, Alejandro A. Schaffer, Jinghui Zhang, Zheng Zhang, Webb Miller, and David J. Lipman (1997), "Gapped BLAST and PSI-BLAST: a new generation of protein database search programs", Nucleic Acids Res. 25:3389-3402.

Query= BXP184.2003.08.12
(1521 letters)

Database: pir1.fst; pir2.fst; pir3.fst; pir4.fst
283,329 sequences; 96,175,589 total letters

Searching.....done

Sequences producing significant alignments:	Score (bits)	E Value
T04730 (PIR) cytochrome P450 homolog F6G17.10 - Arabidopsis thal...	494	e-139
C85441 (PIR) cytochrome P450-like protein [imported] - Arabidopsis	494	e-139
T52174 (PIR) cytochrome P450 monooxygenase [imported] - Arabidopsis	487	e-137
B85441 (PIR) cytochrome P450-like protein [imported] - Arabidopsis	481	e-135
T04731 (PIR) cytochrome P450 homolog F6G17.20 - Arabidopsis thal...	480	e-135
T10896 (PIR) cytochrome P450 (EC 1.14.-.-) 81B1c - Jerusalem art...	468	e-131
A85441 (PIR) cytochrome P450-like protein [imported] - Arabidopsis	464	e-130
T00510 (PIR) probable cytochrome P450 At2g23220 [imported] - Ara...	457	e-128
T00513 (PIR) cytochrome P450 homolog At2g23190 - Arabidopsis tha...	453	e-127
B96691 (PIR) probable cytochrome P450 F28G11.4 [imported] - Arab...	444	e-124

FIG. 5

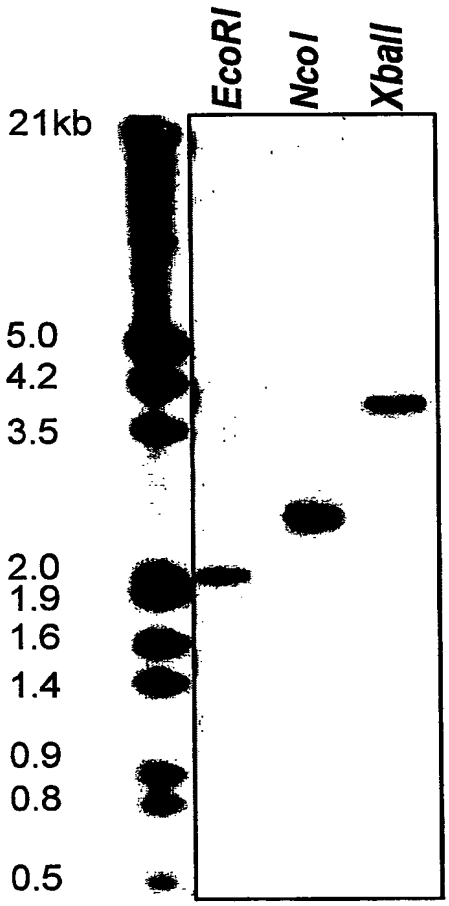


FIG. 6(a) SrSiP189/PINORESINOL

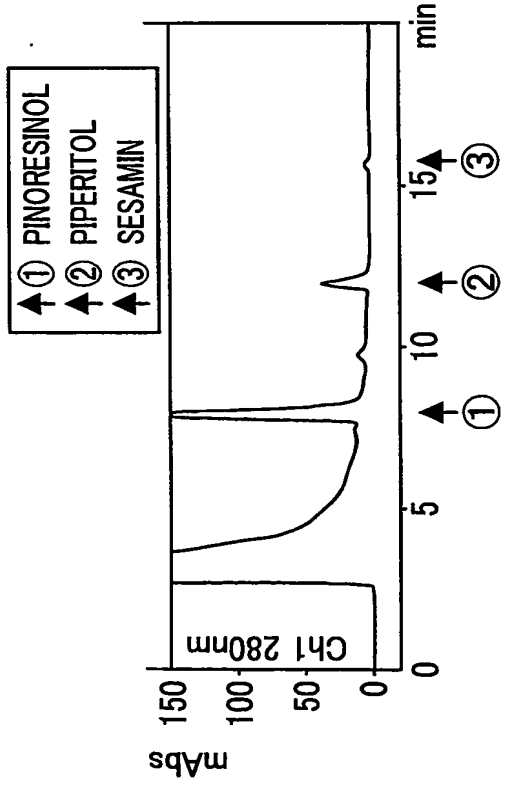


FIG. 6(b) SrSiP189/PIPERITOL

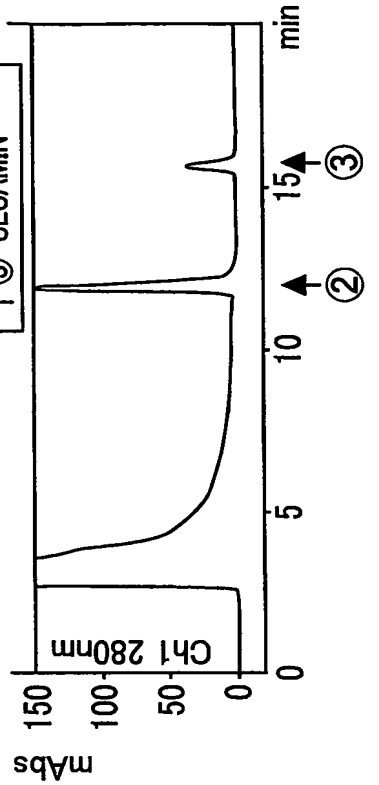


FIG. 6(c) SrSiP189/PINORESINOL

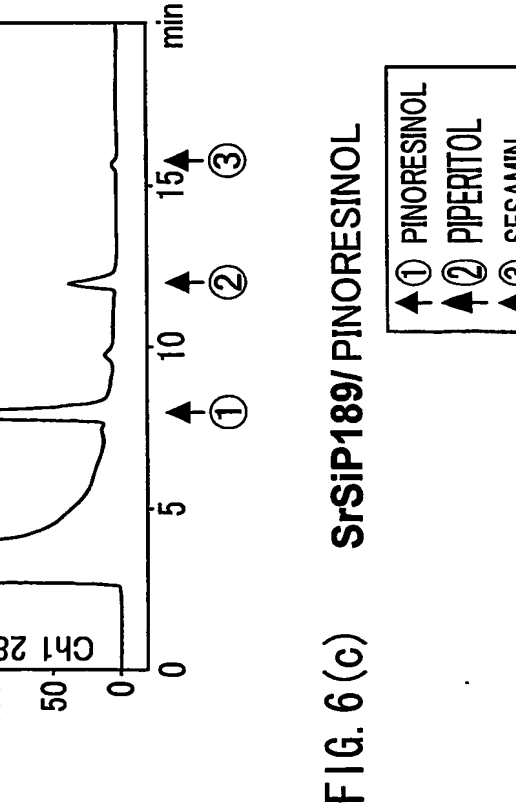


FIG. 6(d) SrSiP189/PIPERITOL

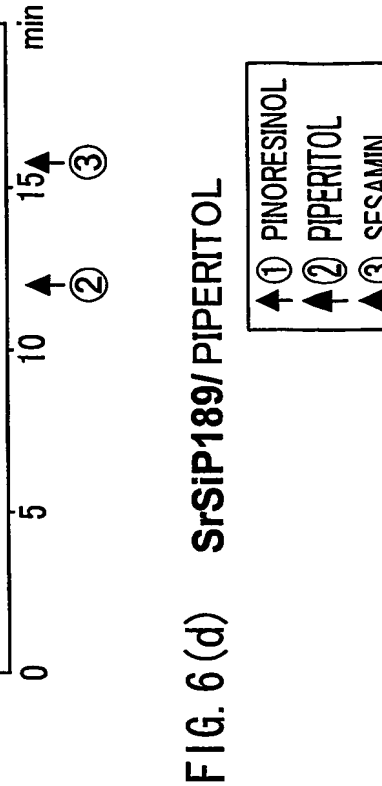


FIG. 7

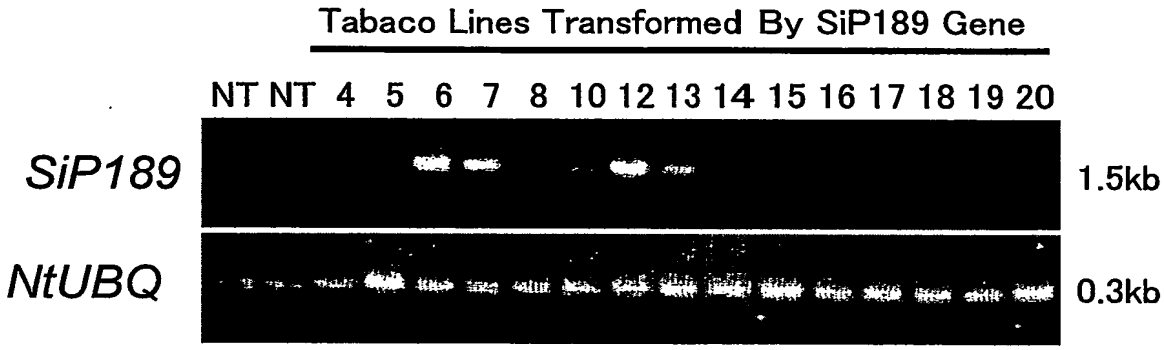

Tabaco Lines Transformed By SiP189 Gene
NT NT 4 5 6 7 8 10 12 13 14 15 16 17 18 19 20
SiP189
1.5kb
NtUBQ
0.3kb

FIG. 8 (a)

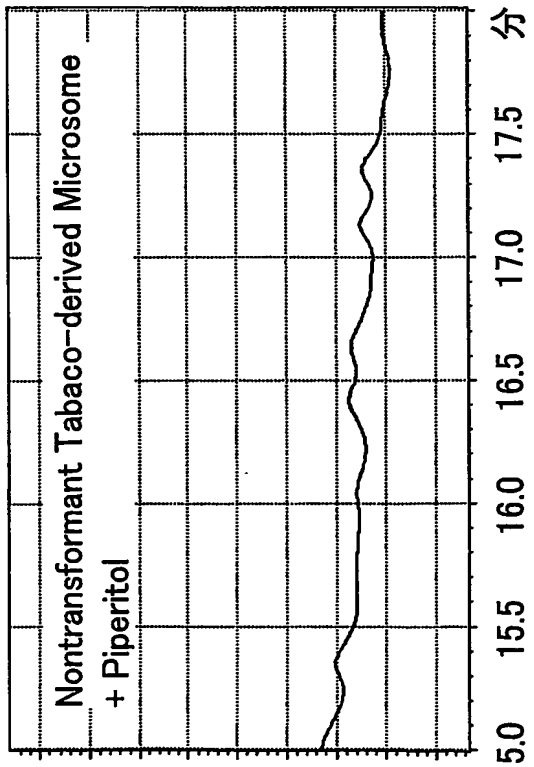


FIG. 8 (b)

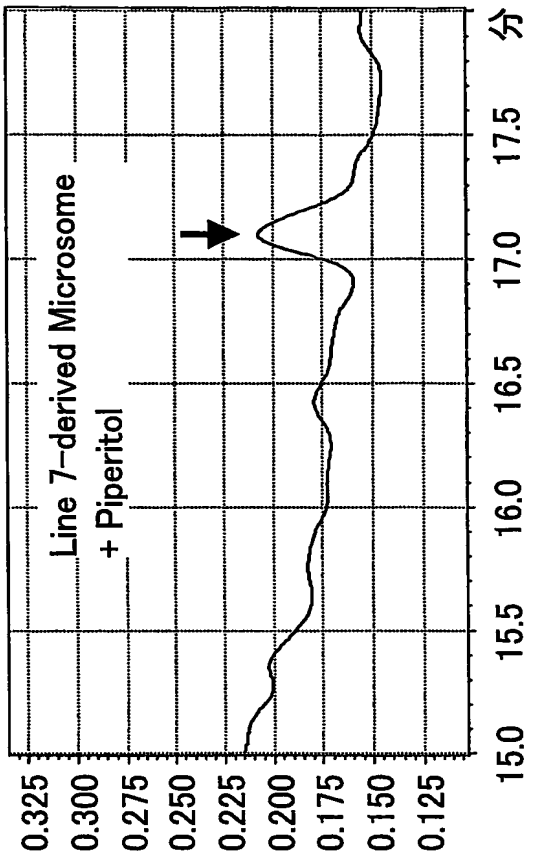
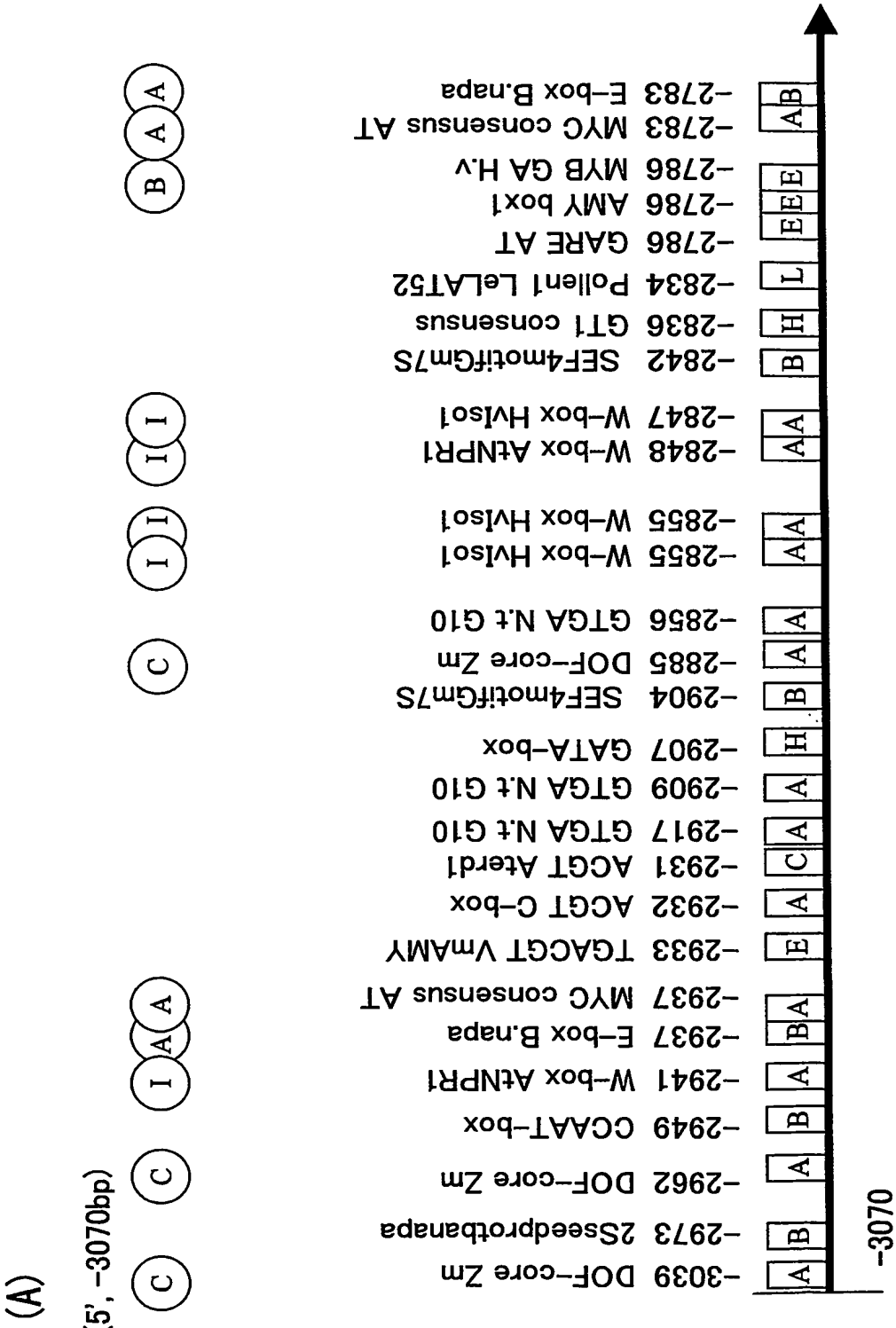


FIG. 8 (c)

FIG. 8 (d)

FIG. 9(A)


(5', -3070bp)
-3070
-3039 DOF-core Zm
-2973 2Sseedprotbanapa
-2962 DOF-core Zm
-2949 CCAAT-box
-2941 W-box AtNPR1
-2937 E-box B.napa
-2937 MYC consensus AT
-2933 TGACGT VmAMY
-2932 ACGT C-box
-2931 ACGT Aterd1
-2917 GTGA N.t G10
-2909 GTGA N.t G10
-2907 GATA-box
-2904 SEF4motifGm7S
-2885 DOF-core Zm
-2856 GTGA N.t G10
-2855 W-box HVIso1
-2855 W-box HVIso1
-2848 W-box AtNPR1
-2847 W-box HVIso1
-2842 SEF4motifGm7S
-2836 GT1 consensus
-2834 Pollen1 LeLAT52
-2786 GARE AT
-2786 AMY box1
-2786 MYB GA H.v
-2783 MYC consensus AT
-2783 E-box B.napa

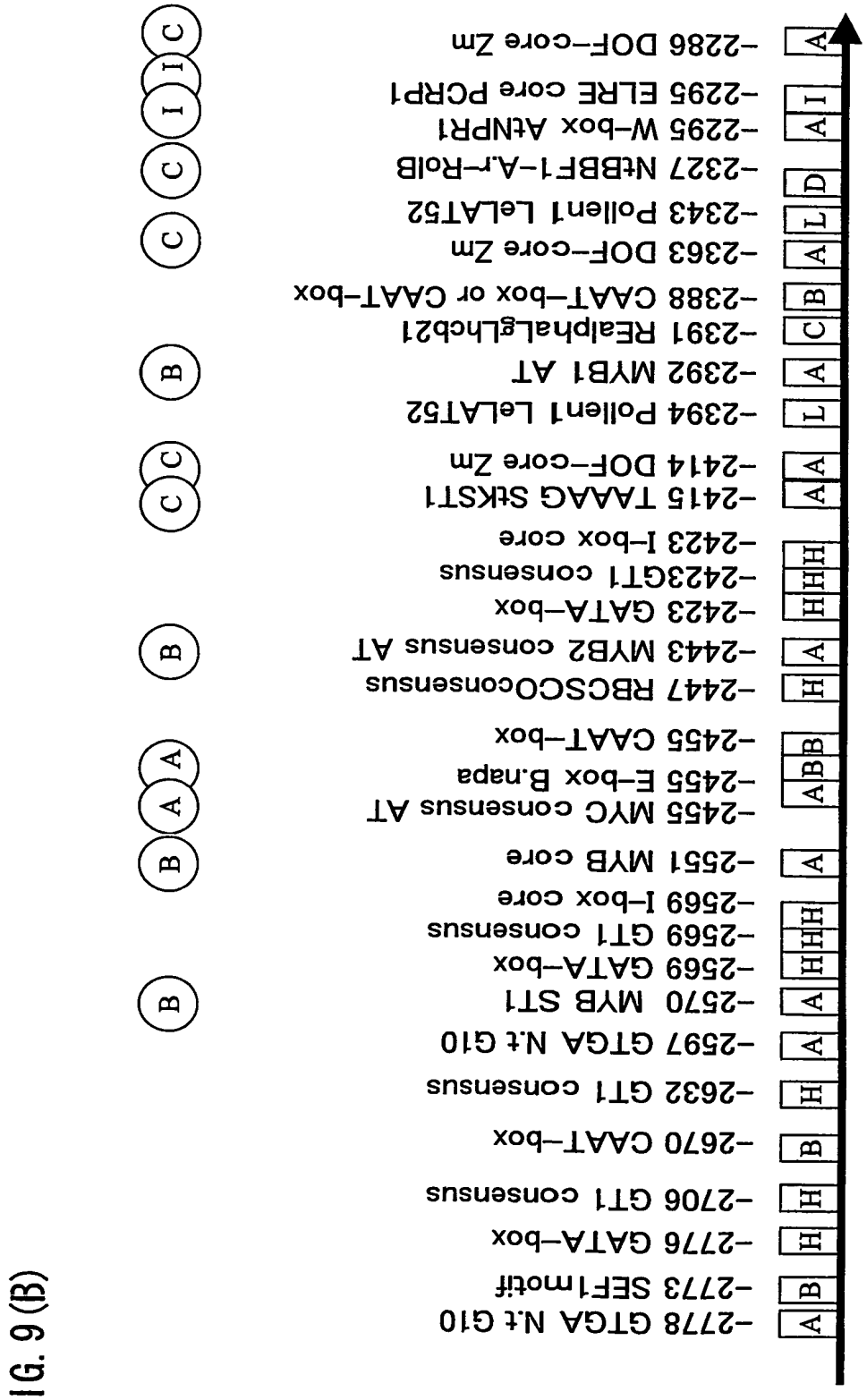
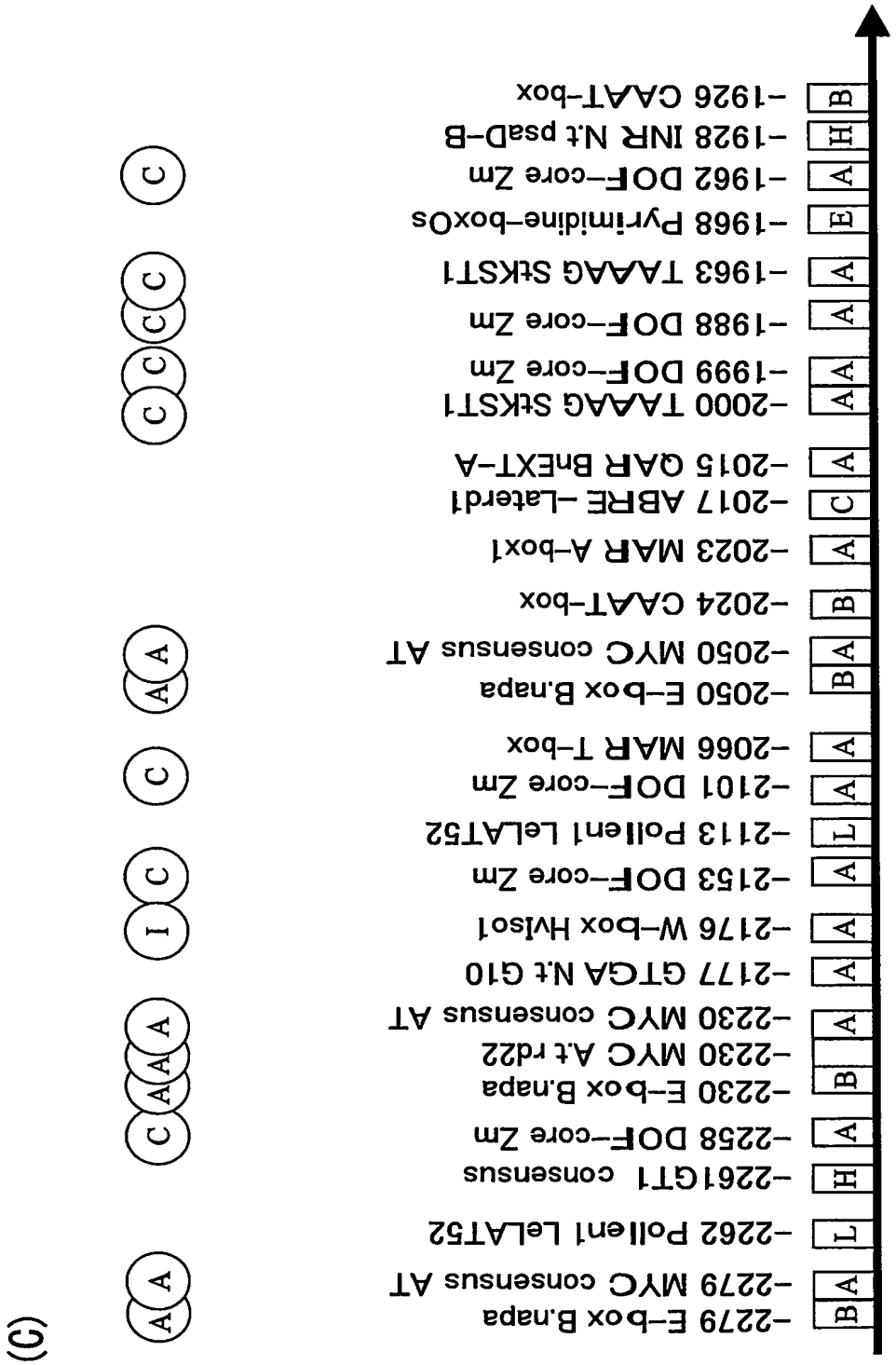

-2778 GTGA N.t G10
-2773 SEF1motif
-2776 GATA-box
-2706 GT1 consensus
-2670 CAAT-box
-2632 GT1 consensus
-2597 GTGA N.t G10
-2570 MYB ST1
-2569 GATA-box
-2569 GT1 consensus
-2569 I-box core
-2551 MYB core
-2455 MYC consensus AT
-2455 E-box B.napa
-2455 CAAT-box
-2447 RBCSCOconsensus
-2443 MYB2 consensus AT
-2423 GATA-box
-2423GT1 consensus
-2423 I-box core
-2415 TAAAG StKST1
-2414 DOF-core Zm
-2394 Pollen1 LeLAT52
-2392 MYB1 AT
-2391 REalphaLgLhcb21
-2388 CAAT-box or CAAT-box
-2363 DOF-core Zm
-2343 Pollen1 LeLAT52
-2327 NtBBF1-A.r-RolB
-2295 W-box AtNPR1
-2295 ELRE core PCRP1
-2286 DOF-core Zm

FIG. 9(B)

FIG. 9(C)


-2279 E-box B.napa
-2279 MYC consensus AT
-2262 PolIen1 LeLAT52
-2261GT1 consensus
-2258 DOF-core Zm
-2230 E-box B.napa
-2230 MYC A.t rd22
-2230 MYC consensus AT
-2177 GTGA N.t G10
-2176 W-box Hvisot
-2153 DOF-core Zm
-2113 PolIen1 LeLAT52
-2101 DOF-core Zm
-2066 MAR T-box
-2050 E-box B.napa
-2050 MYC consensus AT
-2024 CAAT-box
-2023 MAR A-box1
-2017 ABRE -Laterd1
-2015 GAR BnEXT-A
-2000 TAAAG StKST1
-1999 DOF-core Zm
-1988 DOF-core Zm
-1963 TAAAG StKST1
-1968 Pyrimidine-boxOs
-1962 DOF-core Zm
-1928 INR N.t psaD-B
-1926 CAAT-box

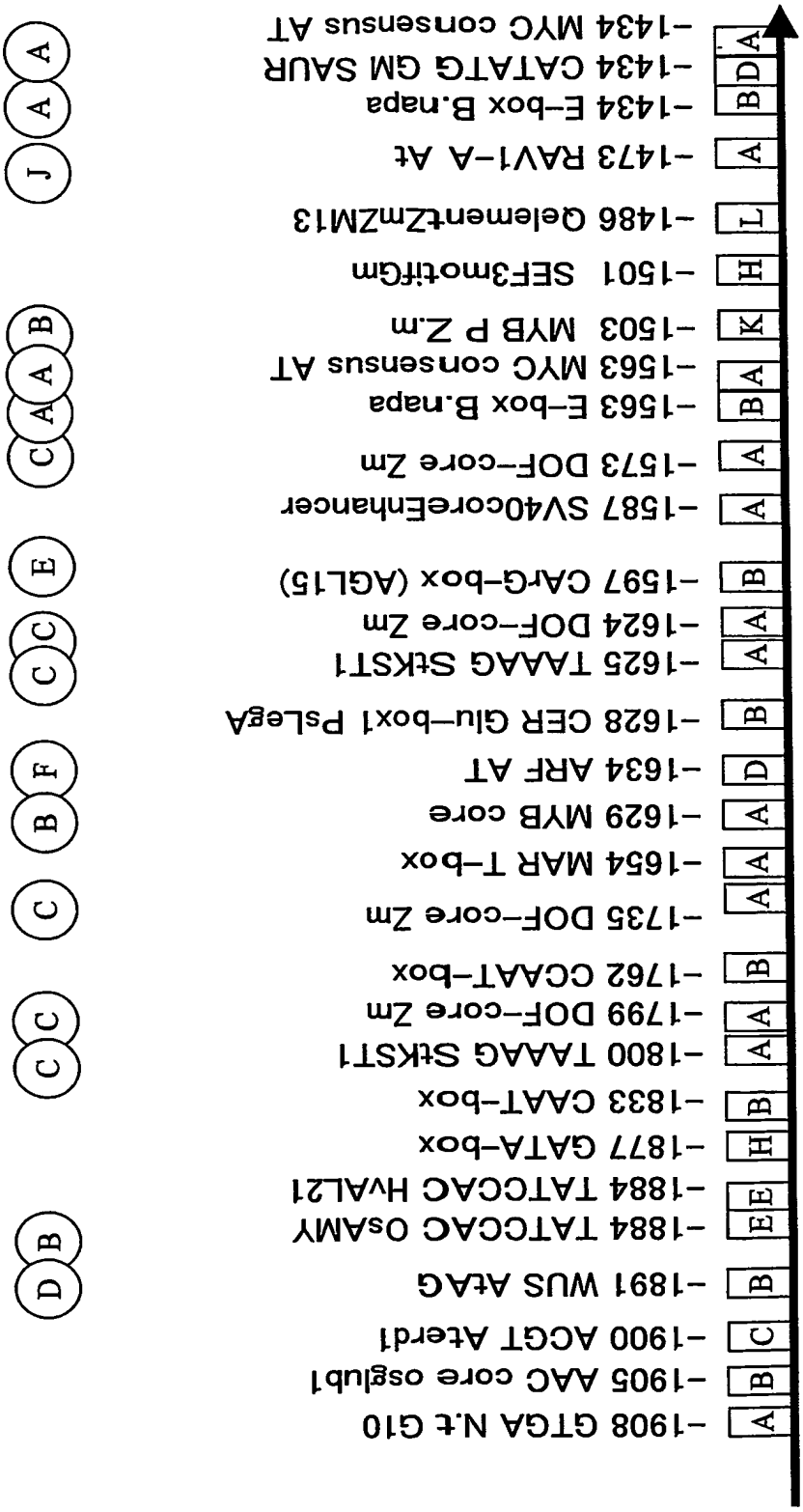

-1908 GTGA N.t G10
-1905 AAC core osglub1
-1900 ACGT Aterd1
-1891 WUS AtAG
-1884 TATCCAC OsAMY
-1884 TATCCAC HvAL21
-1877 GATA-box
-1833 CAAT-box
-1800 TAAAG StKST1
-1799 DOF-core Zm
-1762 CCAAT-box
-1735 DOF-core Zm
-1654 MAR T-box
-1629 MYB core
-1634 ARF AT
-1628 CER Glu-box1 PsLegA
-1625 TAAAG StKST1
-1624 DOF-core Zm
-1597 CArG-box (AGL15)
-1587 SV40coreEnhancer
-1573 DOF-core Zm
-1563 E-box B.napa
-1563 MYC consensus AT
-1503 MYB P Z.m
-1501 SEF3motifGm
-1486 QelementZmZM13
-1473 RAV1-A At
-1434 E-box B.napa
-1434 CATATG GM SAUR
-1434 MYC consensus AT

FIG. 9(D)

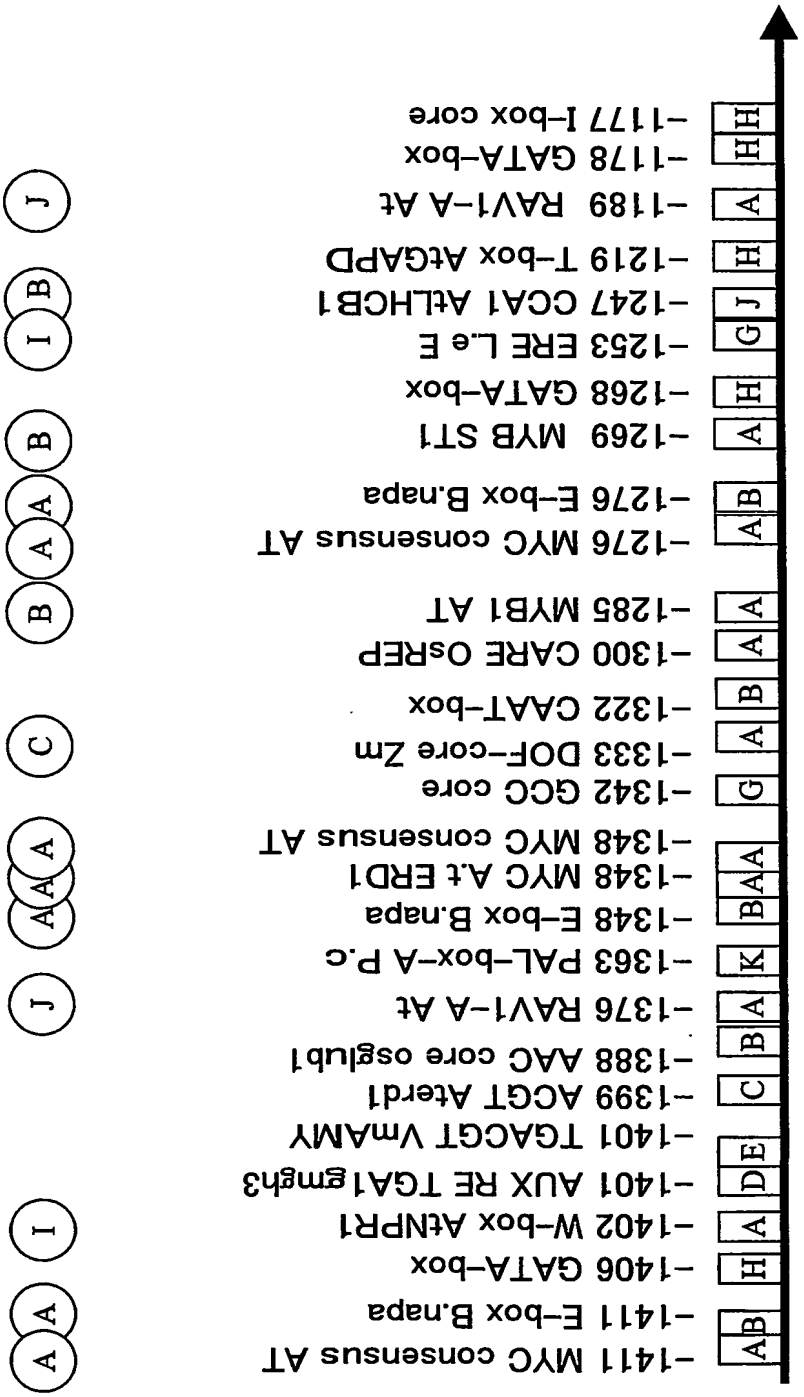
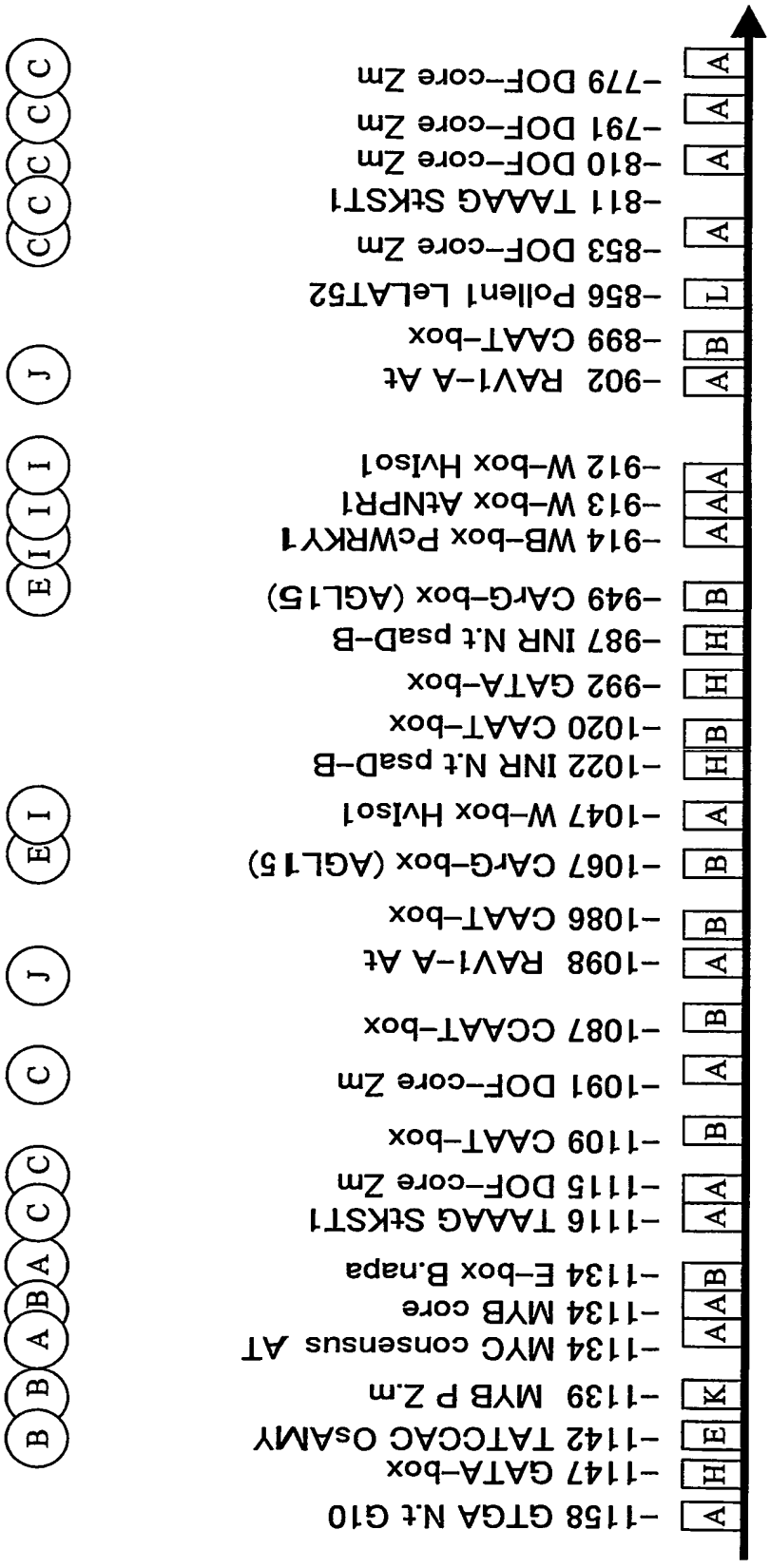

-1411 MYC consensus AT
-1411 E-box B.napa
-1406 GATA-box
-1402 W-box AtNPR1
-1401 AUX RE TGA1gmgh3
-1401 TGACGT VmAMY
-1399 ACGT Aterd1
-1388 AAC core osglub1
-1376 RAV1-A At
-1363 PAL-box-A P.c
-1348 E-box B.napa
-1348 MYC A.t ERD1
-1348 MYC consensus AT
-1342 GCC core
-1333 DOF-core Zm
-1322 CAAT-box
-1300 CARE OsREP
-1285 MYB1 AT
-1276 MYC consensus AT
-1276 E-box B.napa
-1269 MYB ST1
-1268 GATA-box
-1253 ERE L.e E
-1247 GCA1 AtLHCB1
-1219 T-box AtGAPD
-1189 RAV1-A At
-1178 GATA-box
-1177 I-box core

FIG. 9(E)

FIG. 9(F)


-1158 GTGA N.t G10
-1147 GATA-box
-1142 TATCCAC OsAMY
-1139 MYB P Z.m
-1134 MYC consensus AT
-1134 MYB core
-1134 E-box B.napa
-1116 TAAAG StKST1
-1115 DOF-core Zm
-1109 CAAT-box
-1091 DOF-core Zm
-1087 CCAAT-box
-1098 RAV1-A At
-1086 CAAT-box
-1067 CArG-box (AGL15)
-1047 W-box HVIso1
-1022 INR N.t psaD-B
-1020 CAAT-box
-992 GATA-box
-987 INR N.t psaD-B
-949 CArG-box (AGL15)
-914 WB-box PcWRKY1
-913 W-box AtNPR1
-912 W-box HVIso1
-902 RAV1-A At
-899 CAAT-box
-856 Pollen1 LeLAT52
-853 DOF-core Zm
-811 TAAAG StKST1
-810 DOF-core Zm
-791 DOF-core Zm
-779 DOF-core Zm

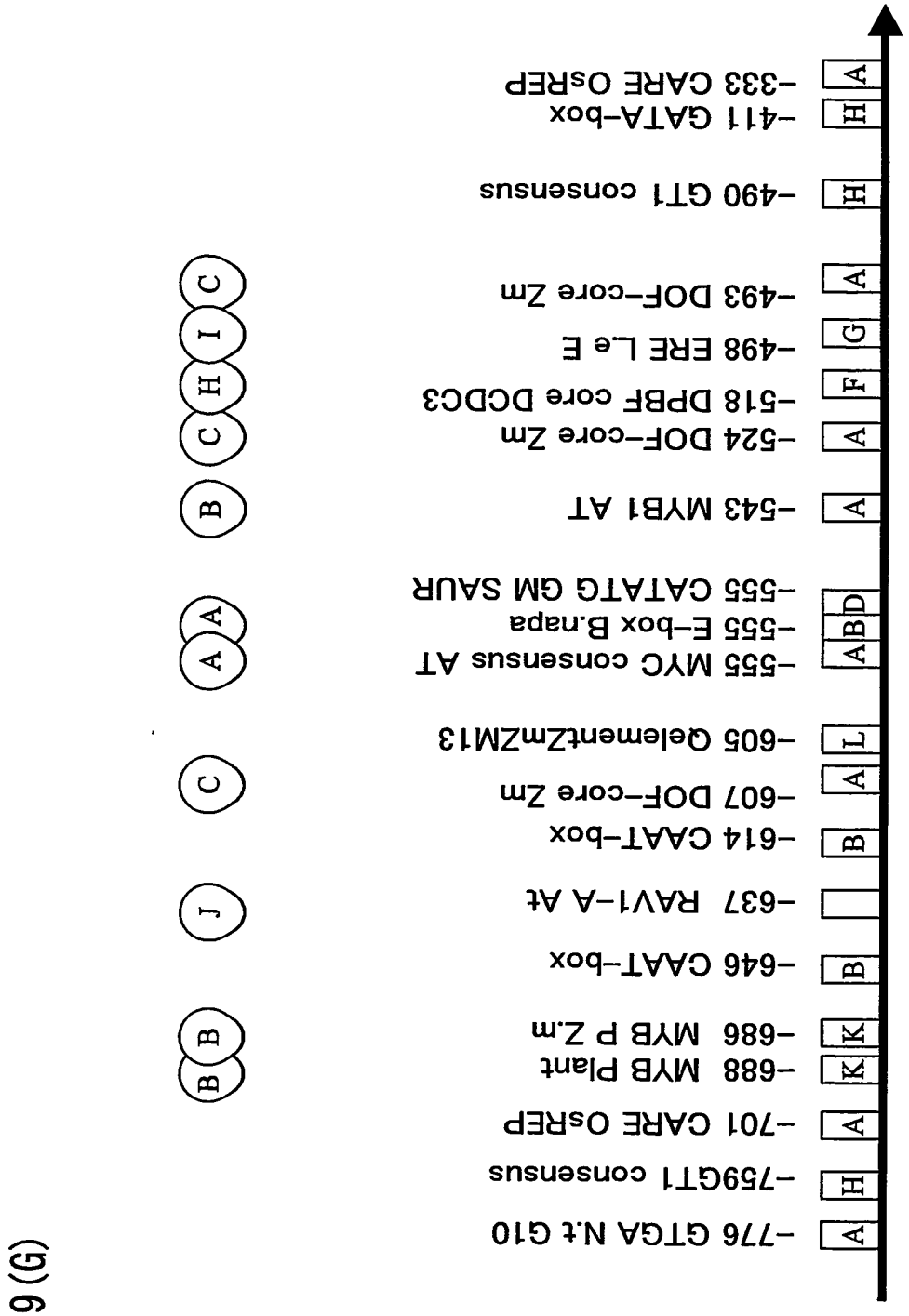

-776 GTGA N.t G10
-759GT1 consensus
-701 CARE OsREP
-688 MYB Plant
-686 MYB P Z.m
-646 CAAT-box
-637 RAV1-A At
-614 CAAT-box
-607 DOF-core Zm
-605 QelementZmZM13
-555 MYC consensus AT
-555 E-box B.napa
-555 CATATG GM SAUR
-543 MYB1 AT
-524 DOF-core Zm
-518 DPBF core DCDC3
-498 ERE Le E
-493 DOF-core Zm
-490 GT1 consensus
-411 GATA-box
-333 CARE OsREP

FIG. 9(G)

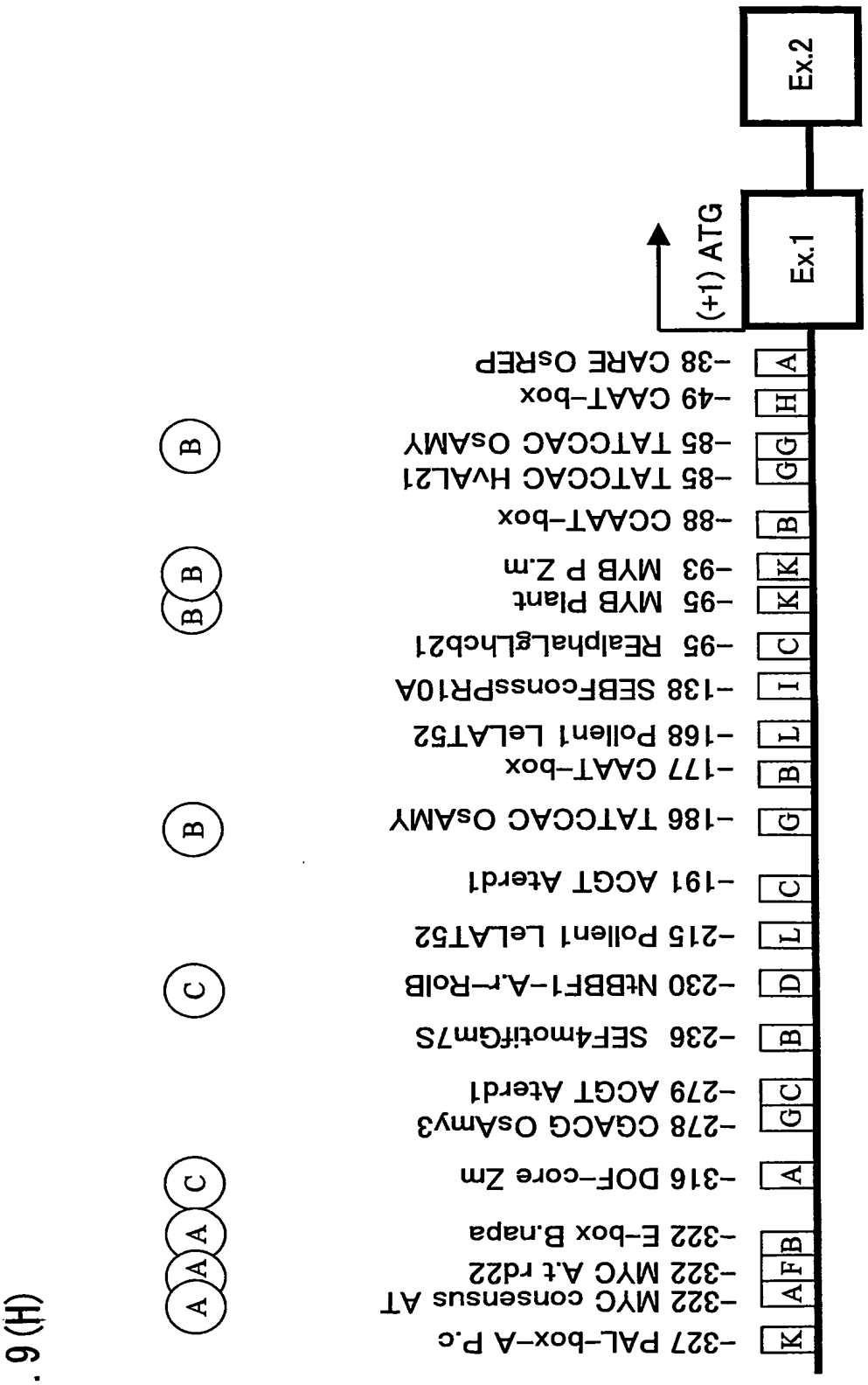

Ex.2
Ex.1
(+1) ATG
-327 PAL-box-A P.c
-322 MYC consensus AT
-322 MYC A.t rd22
-322 E-box B.napa
-316 DOF-core Zm
-278 CGACG OsAmy3
-279 ACGT Aterd1
-236 SEF4motifGm7S
-230 NtBBF1-A.r-RolB
-215 Pollen1 LeLAT52
-191 ACGT Aterd1
-186 TATCCAC OsAMY
-177 CAAT-box
-168 Pollen1 LeLAT52
-138 SEBFconssPR10A
-95 REalphaLgLhcb21
-95 MYB Plant
-93 MYB P Z.m
-88 CCAAT-box
-85 TATCCAC HvAL21
-85 TATCCAC OsAMY
-49 CAAT-box
-38 CARE OsREP

FIG. 9(H)

FIG. 10

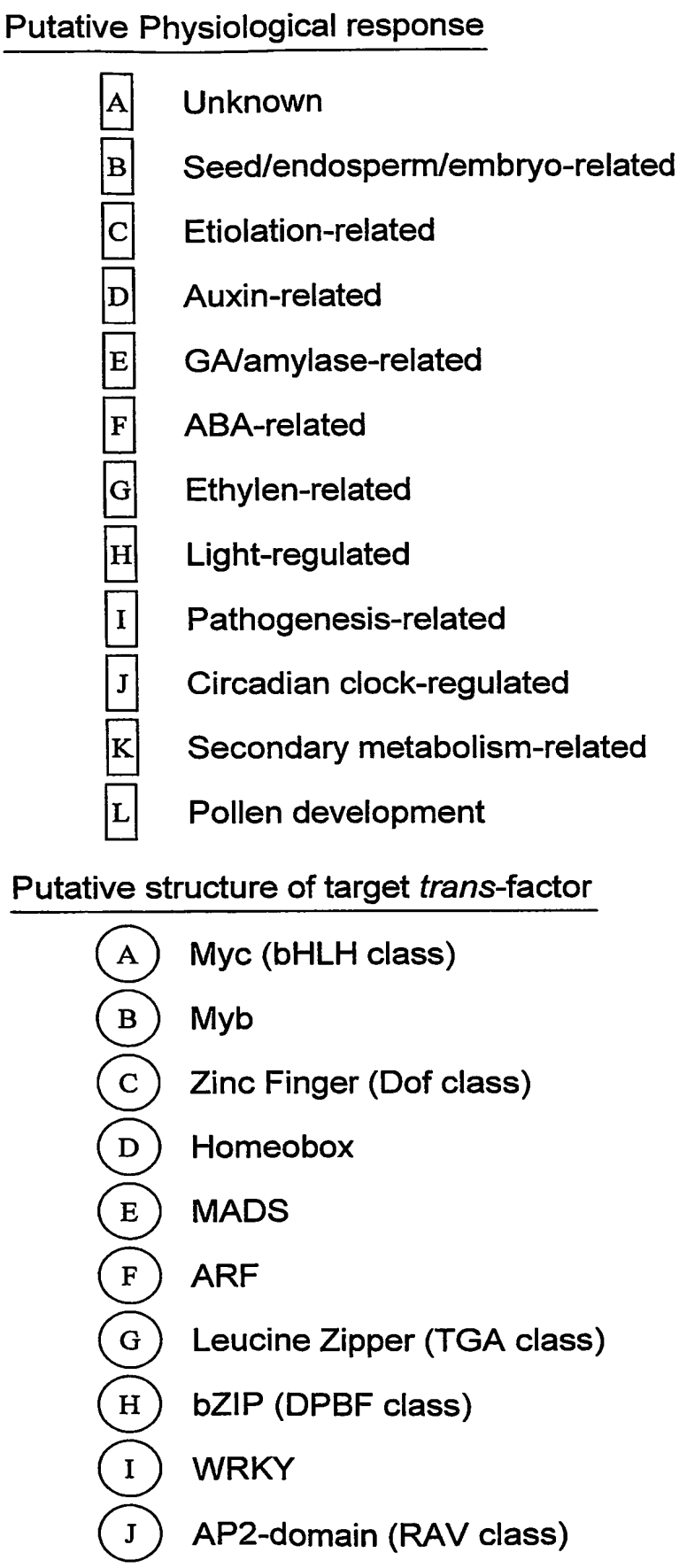
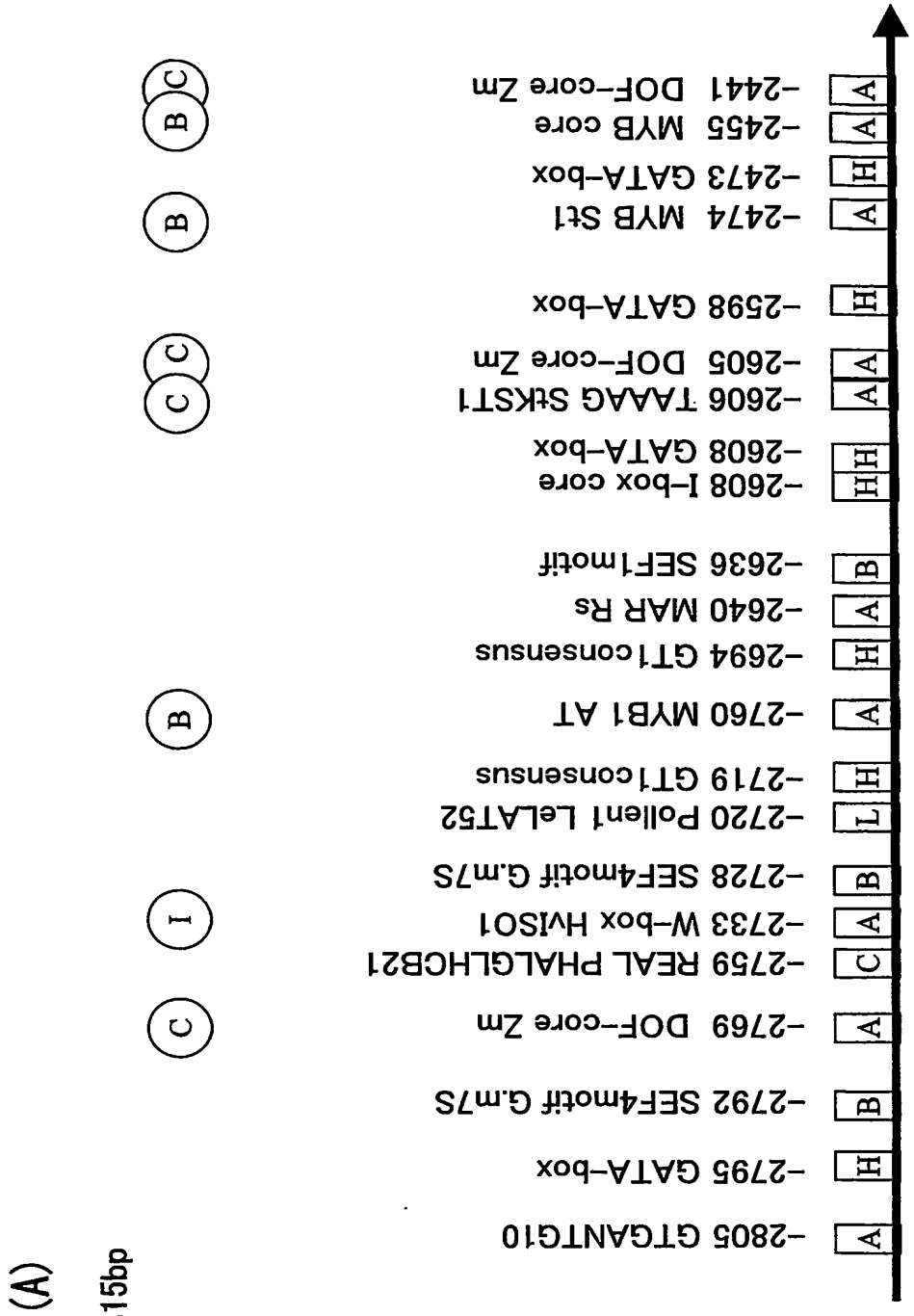

Putative Physiological response
A Unknown
B Seed/endosperm/embryo-related
C Etiolation-related
D Auxin-related
E GA/amylase-related
F ABA-related
G Ethylen-related
H Light-regulated
I Pathogenesis-related
J Circadian clock-regulated
K Secondary metabolism-related
L Pollen development
Putative structure of target trans-factor
A Myc (bHLH class)
B Myb
C Zinc Finger (Dof class)
D Homeobox
E MADS
F ARF
G Leucine Zipper (TGA class)
H bZIP (DPBF class)
I WRKY
J AP2-domain (RAV class)

FIG. 11(A)


2815bp
-2805 GTGANTG10
-2795 GATA-box
-2792 SEF4motif G.m7S
-2769 DOF-core Zm
-2759 REAL PHALGLHCB21
-2733 W-box HvISO1
-2728 SEF4motif G.m7S
-2720 Pollen1 LeLAT52
-2719 GT1consensus
-2760 MYB1 AT
-2694 GT1consensus
-2640 MAR Rs
-2636 SEF1motif
-2608 I-box core
-2608 GATA-box
-2606 TAAAG StKST1
-2605 DOF-core Zm
-2598 GATA-box
-2474 MYB St1
-2473 GATA-box
-2455 MYB core
-2441 DOF-core Zm

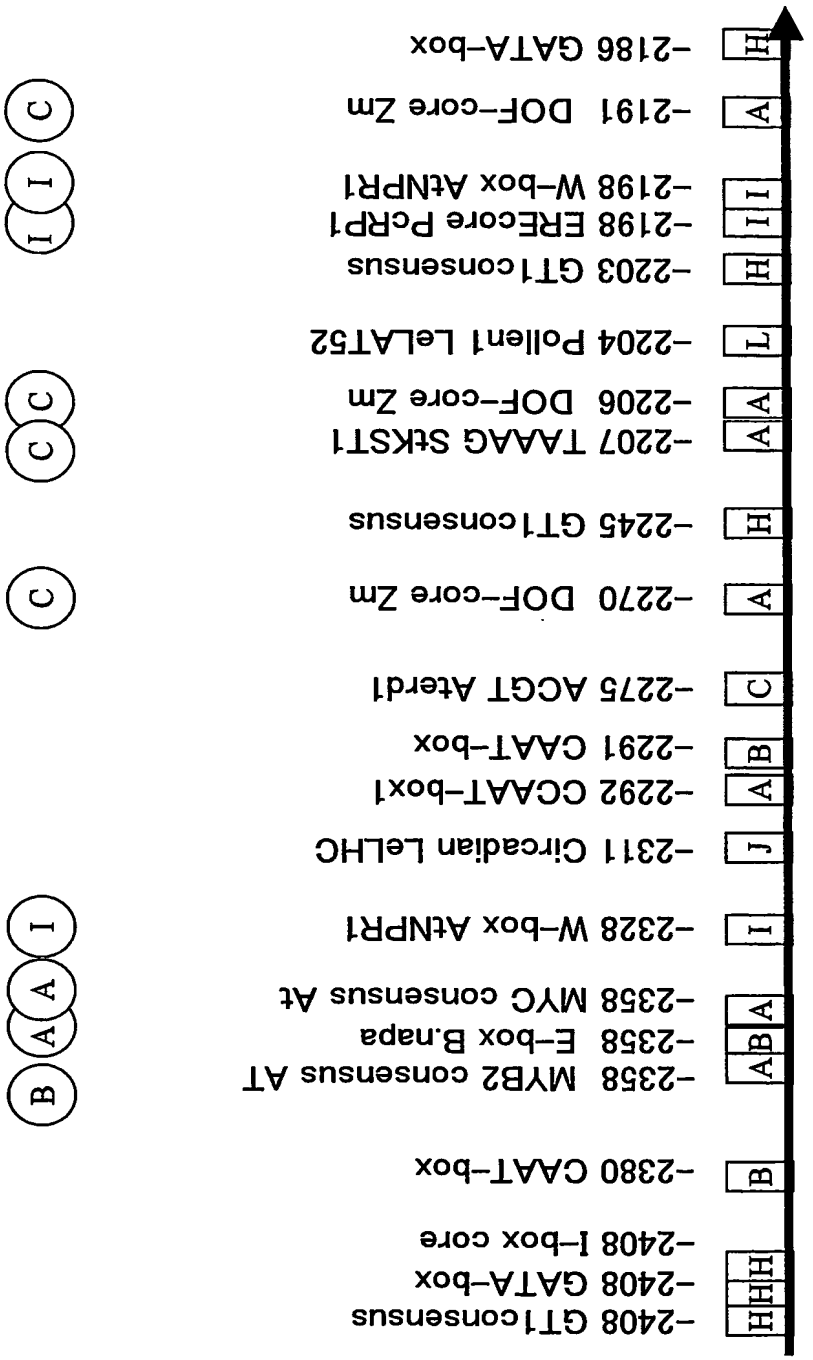
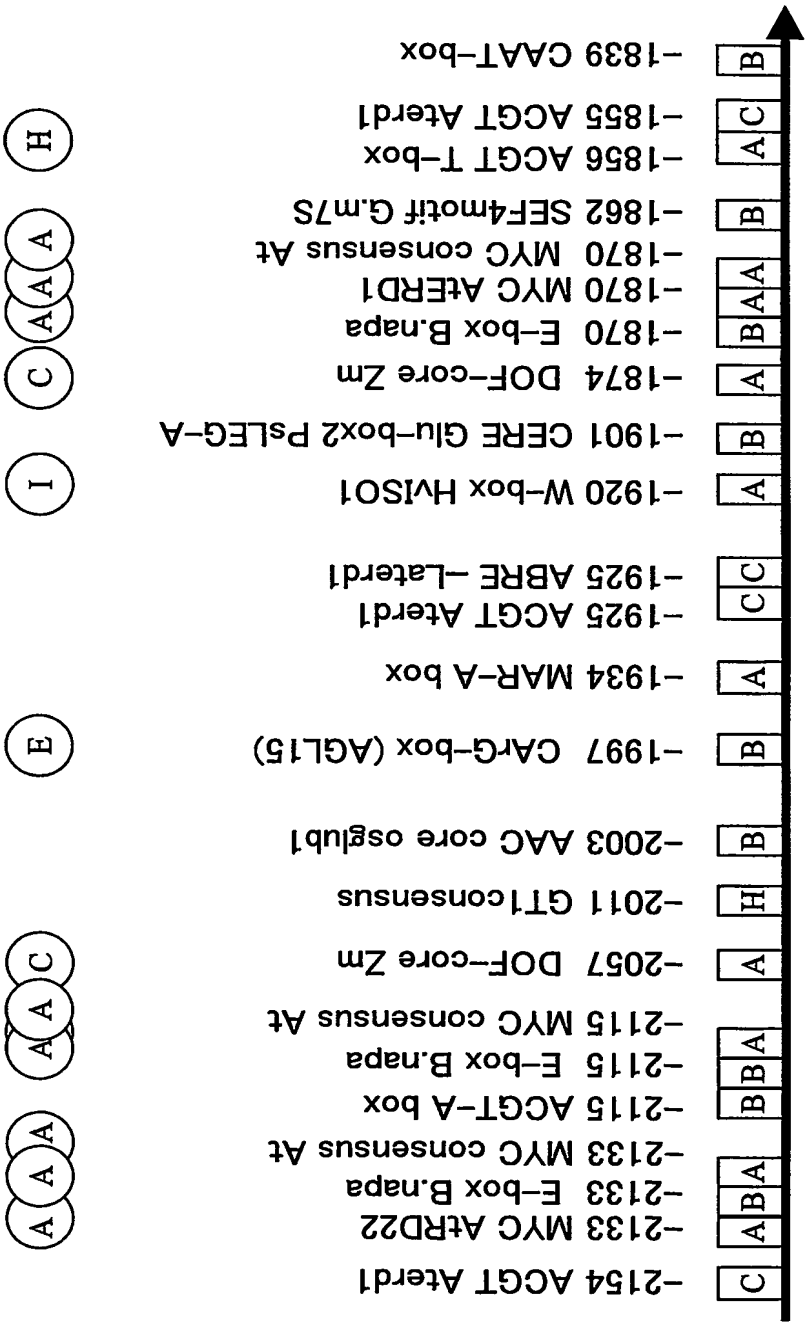

-2408 GT1 consensus
-2408 GATA-box
-2408 I-box core
-2380 CAAT-box
-2358 MYB2 consensus AT
-2358 E-box B.napa
-2358 MYC consensus At
-2328 W-box AtNPR1
-2311 Circadian LeLHC
-2292 CCAAT-box1
-2291 CAAT-box
-2275 ACGT Aterd1
-2270 DOF-core Zm
-2245 GT1 consensus
-2207 TAAAG StKST1
-2206 DOF-core Zm
-2204 Pollen1 LeLAT52
-2203 GT1 consensus
-2198 ERE core PcRP1
-2198 W-box AtNPR1
-2191 DOF-core Zm
-2186 GATA-box
H
A
I
I
H
L
A
A
H
A
C
B
J
A
B
A
I
A
H
H
B
A
A
I
C
C
I

FIG. 11(B)

FIG. 11(C)


-2154 ACGT Aterd1
-2133 MYC ATRD22
-2133 E-box B.napa
-2133 MYC consensus At
-2115 ACGT-A box
-2115 E-box B.napa
-2115 MYC consensus At
-2057 DOF-core Zm
-2011 GT1consensus
-2003 AAC core osglub1
-1997 CArG-box (AGL15)
-1934 MAR-A box
-1925 ACGT Aterd1
-1925 ABRE -Laterd1
-1920 W-box HvISO1
-1901 CERE Glu-box2 PsLEG-A
-1874 DOF-core Zm
-1870 E-box B.napa
-1870 MYC ATERD1
-1870 MYC consensus At
-1862 SEF4motif G.m7S
-1856 ACGT T-box
-1855 ACGT Aterd1
-1839 CAAT-box

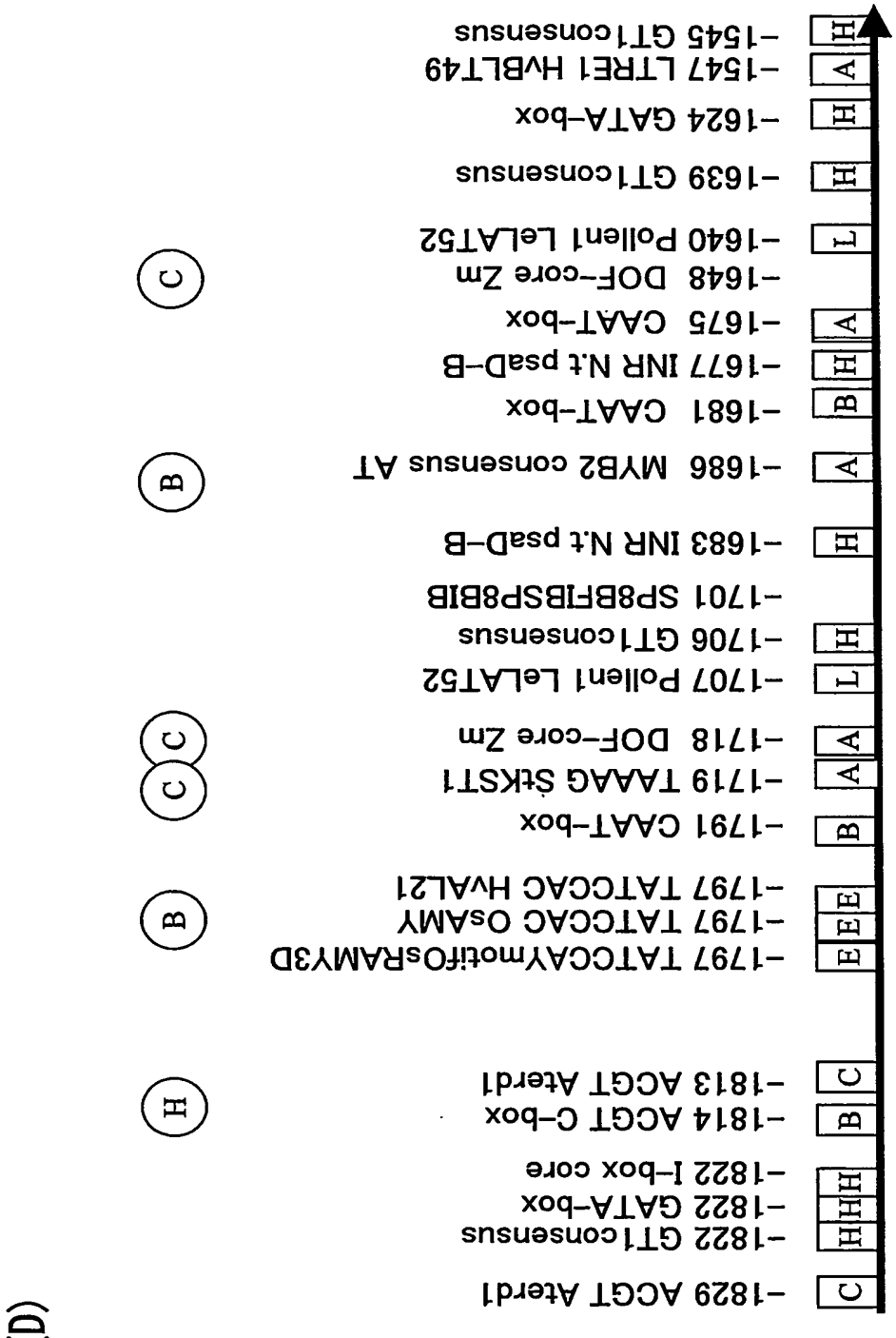

-1545 GT1 consensus
-1547 LTRE1 HvBLT49
-1624 GATA-box
-1639 GT1 consensus
-1640 Pollen1 LeLAT52
-1648 DOF-core Zm
-1675 CAAT-box
-1677 INR N.t psaD-B
-1681 CAAT-box
-1686 MYB2 consensus AT
-1683 INR N.t psaD-B
-1701 SP8BFIBSP8BIB
-1706 GT1 consensus
-1707 Pollen1 LeLAT52
-1718 DOF-core Zm
-1719 TAAAG StKST1
-1791 CAAT-box
-1797 TATCCAC HvAL21
-1797 TATCCAC OsAMY
-1797 TATCCAYmotifOsRAMY3D
-1813 ACGT Aterd1
-1814 ACGT C-box
-1822 I-box core
-1822 GATA-box
-1822 GT1 consensus
-1829 ACGT Aterd1
H
B
C
C
B
C
H

FIG. 11(D)

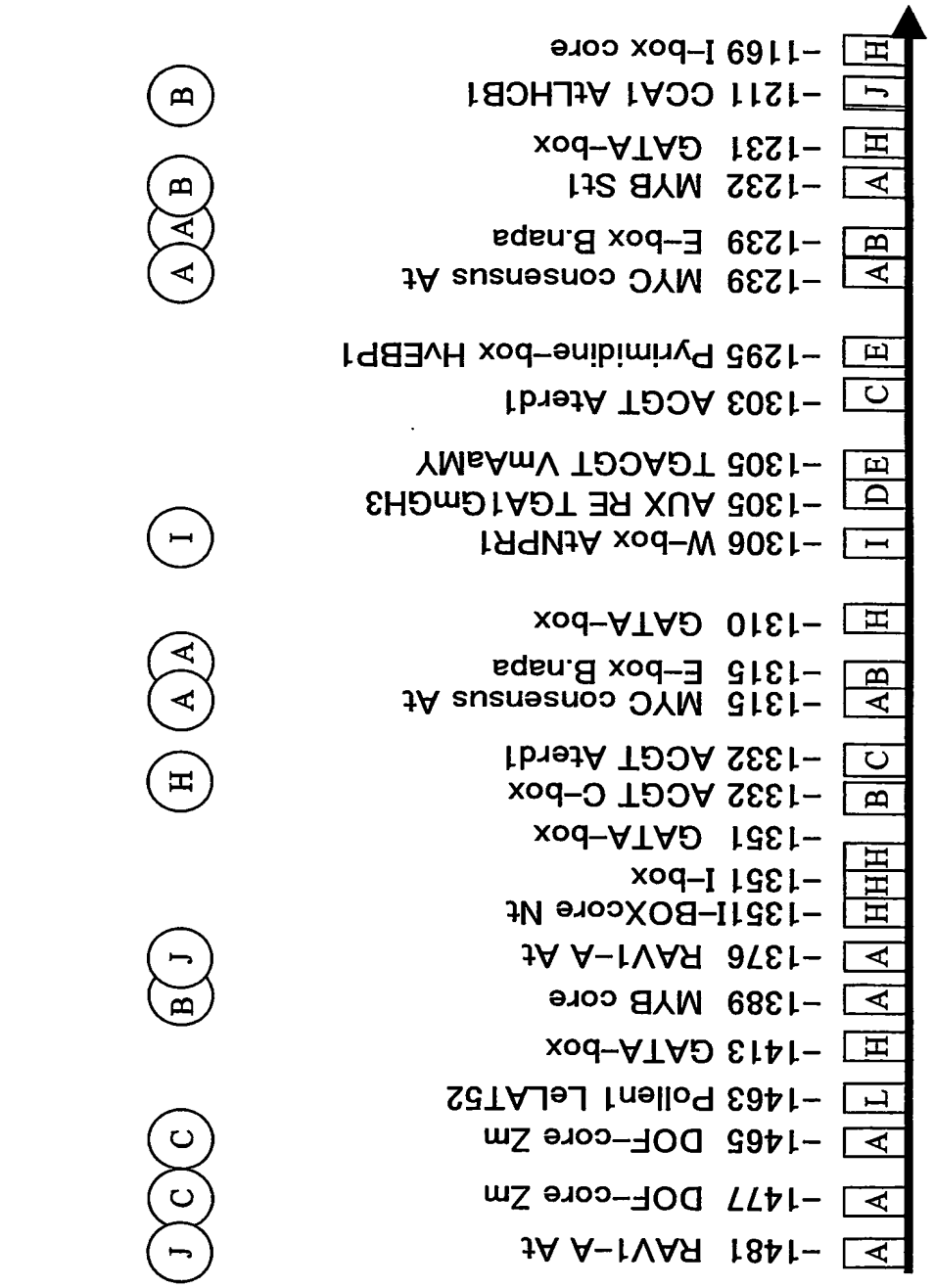

-1481 RAV1-A At
-1477 DOF-core Zm
-1465 DOF-core Zm
-1463 Pollen1 LeLAT52
-1413 GATA-box
-1389 MYB core
-1376 RAV1-A At
-1351I-BOXcore Nt
-1351 I-box
-1351 GATA-box
-1332 ACGT C-box
-1332 ACGT Aterd1
-1315 MYC consensus At
-1315 E-box B.napa
-1310 GATA-box
-1306 W-box AtNPR1
-1305 AUX RE TGA1GmGH3
-1305 TGACGT VmAaMY
-1303 ACGT Aterd1
-1295 Pyrimidine-box HvEBP1
-1239 MYC consensus At
-1239 E-box B.napa
-1232 MYB St1
-1231 GATA-box
-1211 CCA1 AtLHCB1
-1169 I-box core

FIG. 11(E)

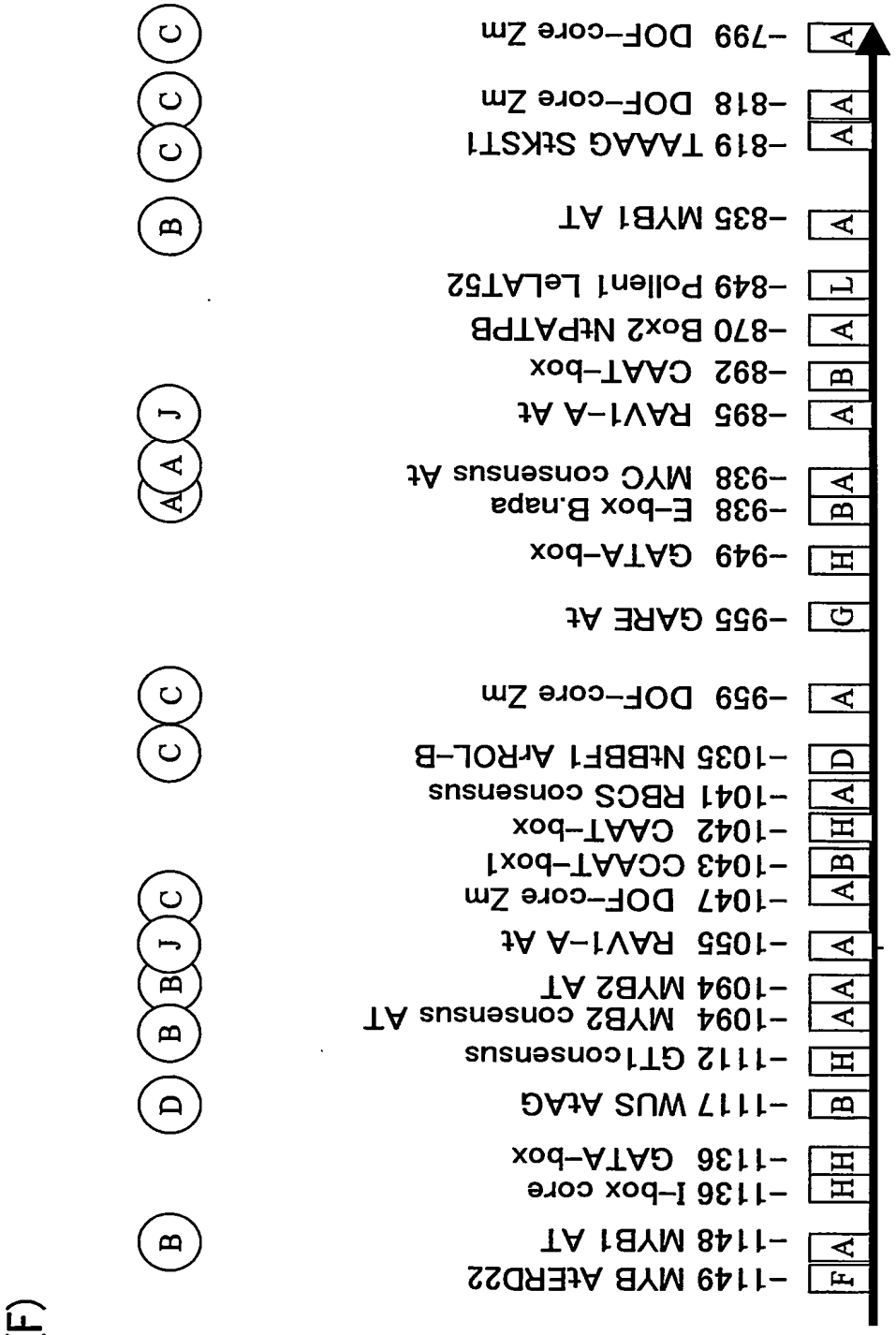

-1149 MYB AtERD22
-1148 MYB1 AT
-1136 I-box core
-1136 GATA-box
-1117 WUS AtAG
-1112 GT1consensus
-1094 MYB2 consensus AT
-1094 MYB2 AT
-1055 RAV1-A At
-1047 DOF-core Zm
-1043 CCAAT-box1
-1042 CAAT-box
-1041 RBCS consensus
-1035 NtBBF1 ArROL-B
-959 DOF-core Zm
-955 GARE At
-949 GATA-box
-938 E-box B.napa
-938 MYC consensus At
-895 RAV1-A At
-892 CAAT-box
-870 Box2 NtPATPB
-849 Pollen1 LeLAT52
-835 MYB1 AT
-819 TAAAG StKST1
-818 DOF-core Zm
-799 DOF-core Zm

FIG. 11 (F)

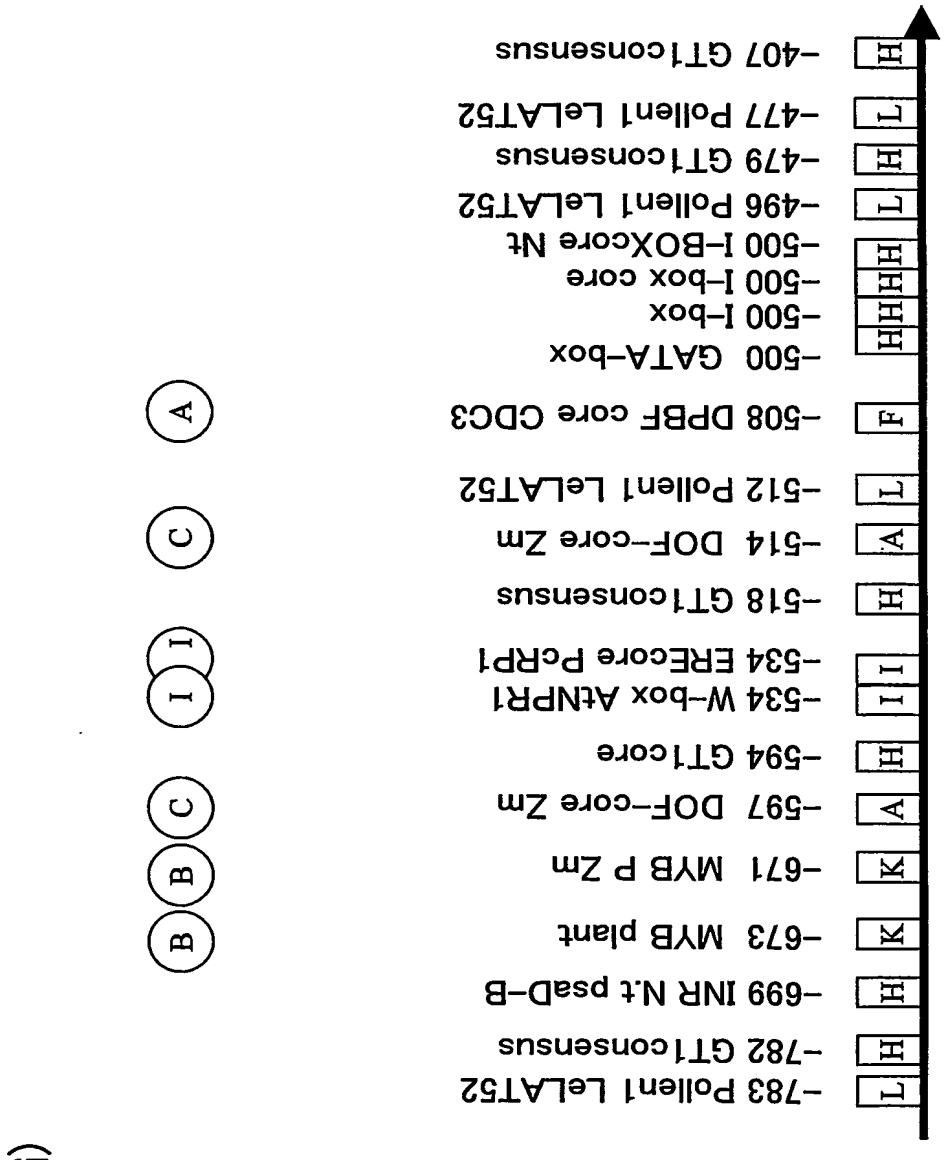

-783 Pollen1 LeLAT52
-782 GT1 consensus
-699 INR N.t psaD-B
-673 MYB plant
-671 MYB P Zm
-597 DOF-core Zm
-594 GT1 core
-534 W-box AtNPR1
-534 EREcore PcRP1
-518 GT1 consensus
-514 DOF-core Zm
-512 Pollen1 LeLAT52
-508 DPBF core CDC3
-500 GATA-box
-500 I-box
-500 I-box core
-500 I-BOXcore Nt
-496 Pollen1 LeLAT52
-479 GT1 consensus
-477 Pollen1 LeLAT52
-407 GT1 consensus
A
B
C
I
I
C
B

FIG. 11 (G)

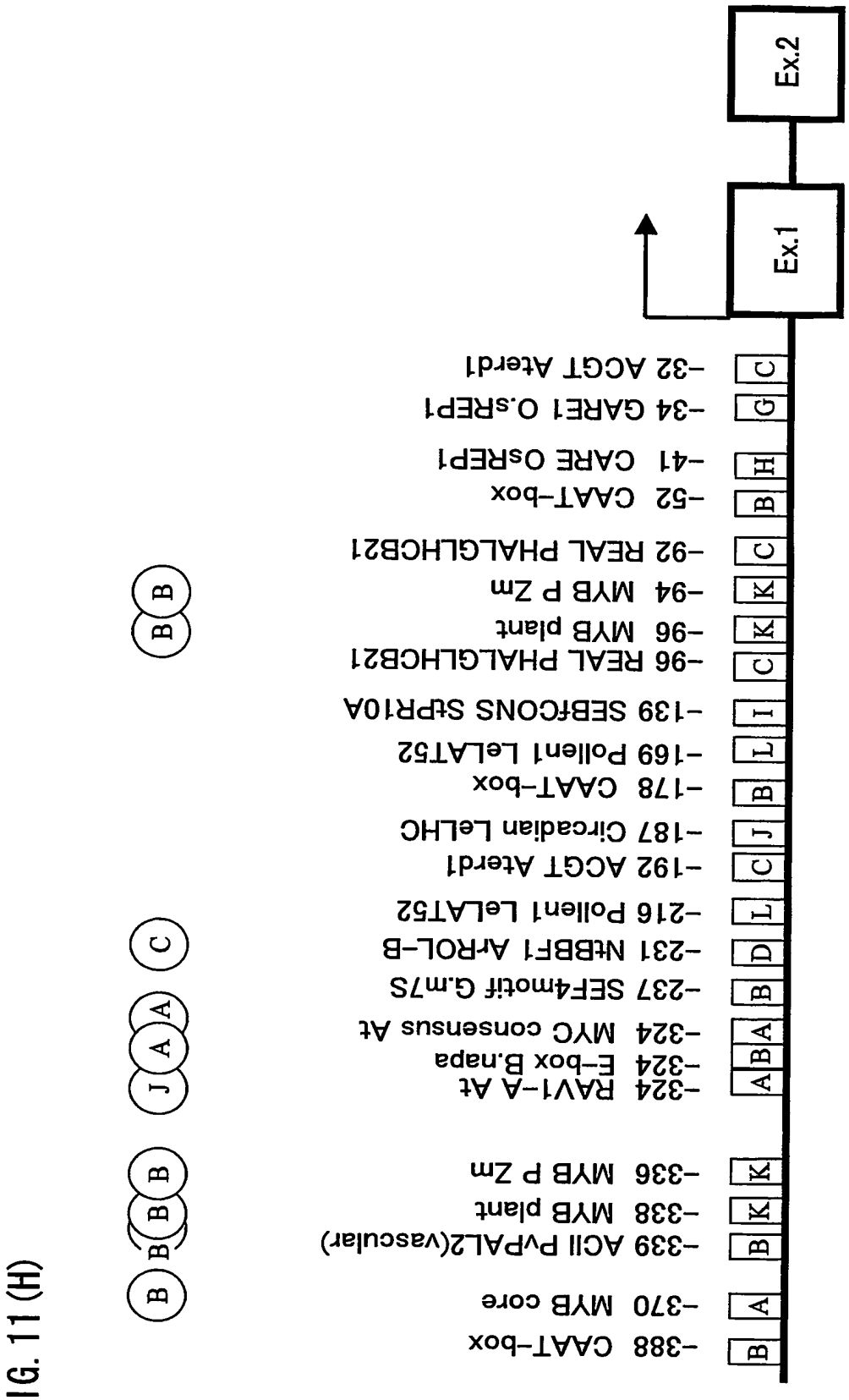

Ex.1
Ex.2
-388 CAAT-box
-370 MYB core
-339 ACII PvPAL2(vascular)
-338 MYB plant
-336 MYB P Zm
-324 RAV1-A At
-324 E-box B.napa
-324 MYC consensus At
-237 SEF4motif G.m7S
-231 NtBBF1 ArROL-B
-216 Pollen1 LeLAT52
-192 ACGT Aterd1
-187 Circadian LeLHC
-178 CAAT-box
-169 Pollen1 LeLAT52
-139 SEBFCONS StPR10A
-96 REAL PHALGLHCB21
-96 MYB plant
-94 MYB P Zm
-92 REAL PHALGLHCB21
-52 CAAT-box
-41 CARE OsREP1
-34 GARE1 O.sREP1
-32 ACGT Aterd1

FIG. 11 (H)

FIG. 12(a)

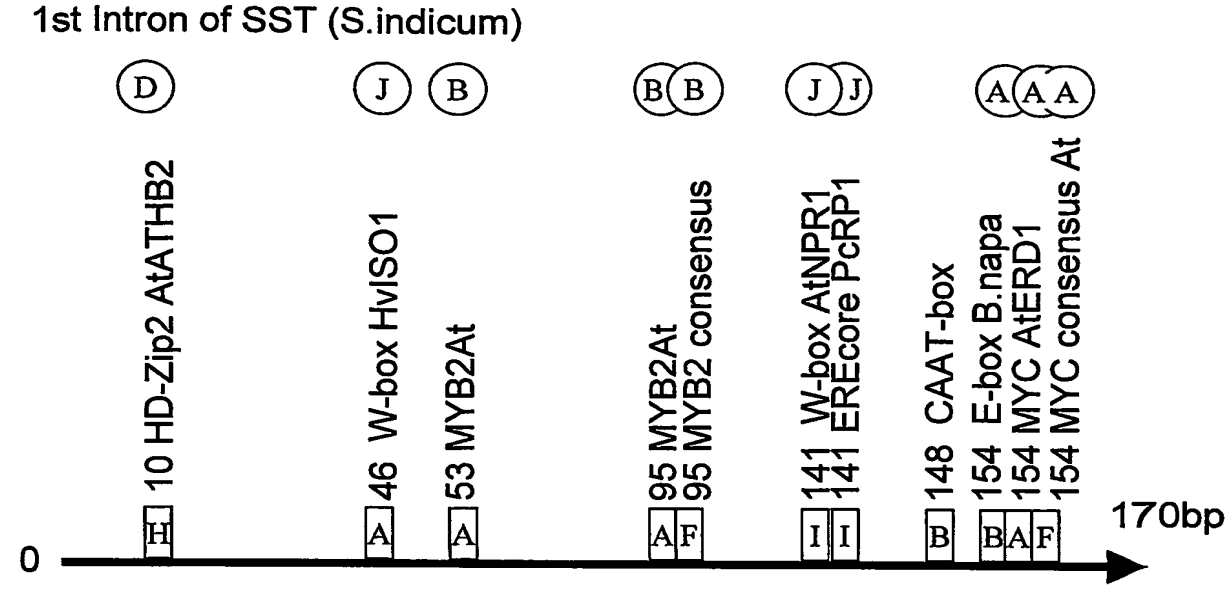


FIG. 12(b)

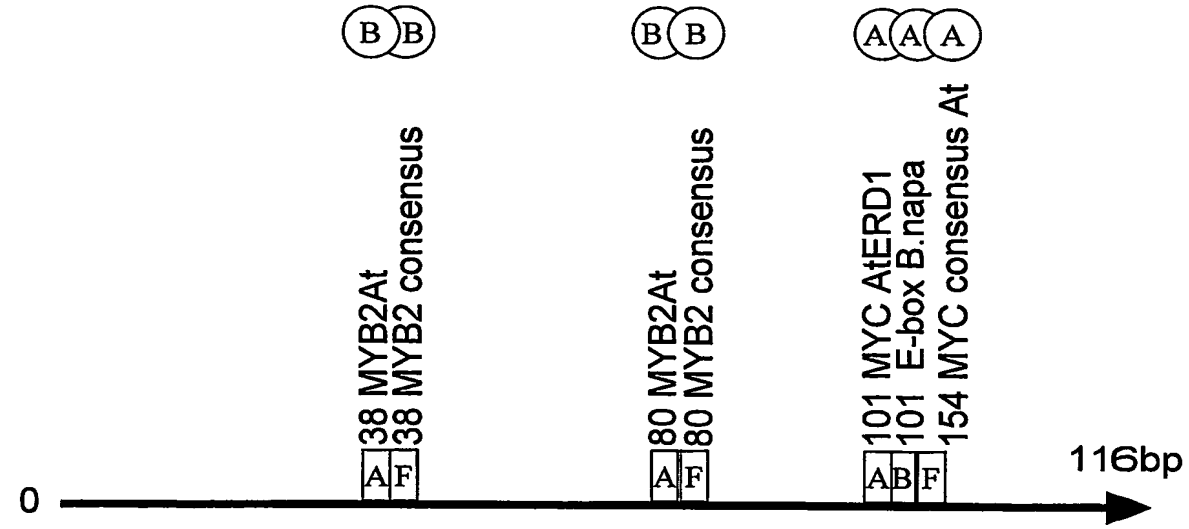


FIG. 12(c)